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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,592	12/19/2001	Tony P. Chiang	M-11466-8C US	1875

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EXAMINER

FULLER, ERIC B

ART UNIT	PAPER NUMBER
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1762

7

DATE MAILED: 09/26/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

7.1.1

Office Action Summary	Application No. 10/027,592	Applicant(s) CHIANG ET AL.	
	Examiner Eric B Fuller	Art Unit 1762	

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address -

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2,3,5</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: According to the declaration filed by the applicant, this application claims priority to US Application Serial No. 09/902,080. However, the specification states that the present application claims priority to US Application Serial No. 09/999,636.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 1 and 20, it is unclear if the second and third mention of "conductance" is the conductance of the outlet stream or the conductance that is implicitly present in other parts (i.e. inlet) of the chamber. In claim 19, it is unclear to which conductance is referred too. This renders the claims vague and indefinite.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in-
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the

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treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-19 are rejected under 35 U.S.C. 102(e) as being anticipated by

Sherman (US 6,342,277 B1).

Sherman teaches a process where a vacuum evacuates a process chamber, an atomic layer deposition gas is fed into a process chamber, the chamber is evacuated again, a second reactive gas is supplied to the chamber, and the process cycle is completed with another evacuation (figure 2; column 5, lines 5-30). It is taught that the exhaust valve is open during evacuation and closed during the gas feeding steps (column 6, lines 28-40). This reads on varying the conductance of the exit gas by varying the restriction through which the gas exists the chamber. This valve also inherently would cause the flux and pressure of the feed steps to vary from the flux and pressure of the exhausting steps. The reactive gas is activated by a plasma discharge (column 12, lines 62) from an RF source (column 6, line 24), such that it includes ions and reactive atoms. It is taught that the exhausting steps are performed by evacuating the chamber while flowing non-activated reactive gas (column 7, lines 55-67), which reads on purging. Figure 2 shows that the gas flows, when flowing, are constant. Although the inverse relationship of pressure and flux to conductance is not specifically taught, it is the examiner's position that this is an inherent phenomenon.

Claim Rejections - 35 USC § 103

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 4-8, 10, 14, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suntola et al. (US 4,413,022) in view of Suzuki (US 2001/0048981 A1) and Tanaka (US 5,091,207).

Suntola teaches a method of fabricating a thin film on a substrate by using atomic layer deposition (column 1, lines 35-51). As the first reagent gas, or stream of reactive atoms, is flowed into the chamber, the pressure is increased and held at a certain pressure. The pressure is then allowed to drop as the first reagent is purged. As the second reagent is flowed into the chamber, the pressure is allowed to rise again to a constant amount. The cycle is completed with a purging at reduced pressure again (figure 1; column 4, lines 1-52). It is the examiners position that as one varies the pressure, the flux is varied as well. The reference fails to teach these pressure/flux changes as being controlled by exit conductance.

However, Senzaki teaches a process where pressure is varied in a chamber. It is taught that controlling the conductance of the exhaust system, while keeping the inflow constant, controls the pressure (0030). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to perform the pressure changes of Suntola by leaving the mass of the inflow constant and adjusting the conductance of the exhaust stream. By doing so, one would have a

reasonable expectation of success. The combined references fail to teach that varying the restriction of the gas flowing through the exhaust controls the conductance.

However, Tanaka teaches valves that restrict the flow of exhaust gas in order to control the conductance (column 4, lines 30-66). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize the valve of Tanaka to restrict the gas flow of Suntola and Suzuki. By doing so, one would have a reasonable expectation of varying the pressure of Suntola.

As to claims 5 and 6, Suzuki teaches this inverse relationship in paragraph 0030.

As to claims 7, 8, 14, 18 and 19, as one alters the conductance to attain the pressures of Suntola, a periodic changing of lower to higher conductance levels is achieved. Specifically, low conductance is used as the pressure is high during the reactive gas flows, and the conductance is high during the low pressure purging.

As to claim 20, to perform the process in the apparatus of Tanaka would have been obvious at the time the invention was made to a person having ordinary skill in the art as it provides a more uniform flow through the chamber (column 6, lines 24-26). The valves are on the periphery of the chamber and act as shields as they act to block gas flow. Therefore, the valves of Tanaka read on the limitations of claim 20.

Claims 3, 9, 11-13, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suntola et al. (US 4,413,022) in view of Suzuki (US 2001/0048981 A1) and Tanaka (US 5,091,207), as applied to claims 1 and 7 above, and further in view of Sherman (US 6,342,277 B1).

It has been shown above that the combination of Suntola, Suzuki, and Tanaka teaches the limitations of claims 1 and 7. These references fail to teach that the reactive gas is plasma from an RF source. However, Sherman teaches that using plasma as the reactive gas allows for quicker deposition times (column 7, lines 35-65). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize plasma in the process of Suntola, with the modifications made obvious by Suzuki and Tanaka. By doing so, deposition times are reduced. An RF source ignites the plasma (column 6, line 24).

Double Patenting

Claims 1-20 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 58-75 of copending Application No. 09/902,080. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims in application 09/902,080 includes to create a pressure differential between the chamber and the outside area. Although this is not explicitly claimed in claim 1 of the present invention, it would have been obvious at the time the invention was made to a person having ordinary skill in the art.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. DiMeo, Jr. et al. (US 5,972,430) and Goto et al. (Appl. Phys. Lett. June 1996) are cited for teaching ALD reactions. Park (US 2001/0050039 A1) teaches that it is known to vary the pressure in an ALD process. Matsuki et al. (US 6,383,955 B1) teaches that it is known in the art that pressure and residence time are related.

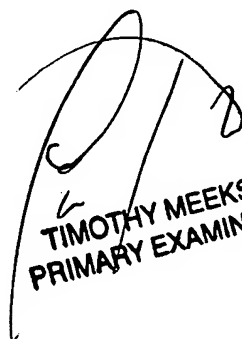
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF
September 23, 2002



TIMOTHY MEEKS
PRIMARY EXAMINER